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# SNOW SAMPLING SURVEY
in the vicinity of
DOMTAR PACKAGING LIMITED
RED ROCK, ONTARIO, 1986.

Ontario

Ministry of the Environment

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## INTRODUCTION

Domtar Packaging Limited operates a kraft pulp mill in the town of Red Rock. Ministry of the Environment studies in 1977 and 1978 revealed that sodium and sulphate, discharged to the air from the mill, were significantly elevated in snow in the surrounding area.[1,2]

In October 1982, Domtar installed a new recovery boiler. Moss exposure studies in 1983-84 showed much reduced levels of sodium as a result of this abatement action.[3]

To determine the current status of particulate fallout in Red Rock, a snow sampling survey was conducted in February, 1986.

## METHODS

Single samples of snow were collected on February 14, 1986 from 11 sites near the Domtar kraft mill (Figure 1) and from two control sites remote from the study area. Core samples of the complete snow profile were obtained following standard Ministry sampling procedures.[4] Snow meltwater samples were submitted to the Ministry's Thunder Bay Laboratory for determination of calcium, sodium, chloride, sulphate, conductivity and pH. Analysis of carbon and solids was performed at the Ministry's Toronto Laboratory.

Contaminant guidelines developed by the Ministry are used in this report. Their exceedence would suggest that contamination may be present, but would not necessarily imply adverse effects.

Insoluble particulate matter in selected samples of snow meltwater were examined with a dissecting microscope.

## RESULTS

Chemical analysis results from the 1978 and 1986 surveys are presented in Tables 1 and 2. Levels of some parameters slightly exceeded Ministry guidelines at sampling sites off company property. The distribution patterns for all parameters were similar to one shown in Figure 2 for suspended solids. Parameter values were highest near the mill and declined as distance from the mill increased.

Except for sulphate, which declined from 1978 to 1986, snow chemistry in 1978 and 1986 was similar (Table 1).

Sample core depth of snow averaged 38 cm (centimetres) and ranged from 30 to 48 cm. Trace to moderate quantities of wood fines and black particulate matter (wood or bark char) were visible in the snow profile or on the snow surface at all sites, except at stations 18, 25 and at the two controls. Heaviest concentrations of wood fines were found near the mill and woodchip piles, while black particulate matter was distributed uniformly at most sites. Microscopic examination determined that, at sites on company property, wood fibres and wood and bark char accounted for about 90% of the suspended solids in snow. In the townsite, these substances also comprised most of the suspended solids, but suspended solids values met the Ministry guideline in the townsite area.

## CONCLUSIONS

The 1986 snow survey around Domtar Packaging Limited in Red Rock demonstrated that snow chemistry usually met Ministry guidelines at off-property sampling sites. The few guideline exceedences off property were not excessive. Levels of calcium, chloride, sodium and pH were similar to values reported for a previous survey in 1978.

Sulphate concentrations were lower in 1986 than in 1978. Significantly elevated concentrations of all parameters were restricted to company property. Levels of particulate fallout, as determined by this study, pose no known potential nuisance or environmental hazard. These results confirm findings from the Ministry's dustfall measurement program in Red Rock, which shows that, off company property, fallout of particulate matter usually complies with Ontario objectives.[5] Beyond the current Control Order issued to Domtar Packaging Limited, which includes controls on air emissions, results of the 1986 snow sampling survey do not indicate a need for further abatement of particulate matter emissions at this time.

## REFERENCES


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4. Ontario Ministry of the Environment. 1981. Outlines of analytical methods, Laboratory Services Branch.

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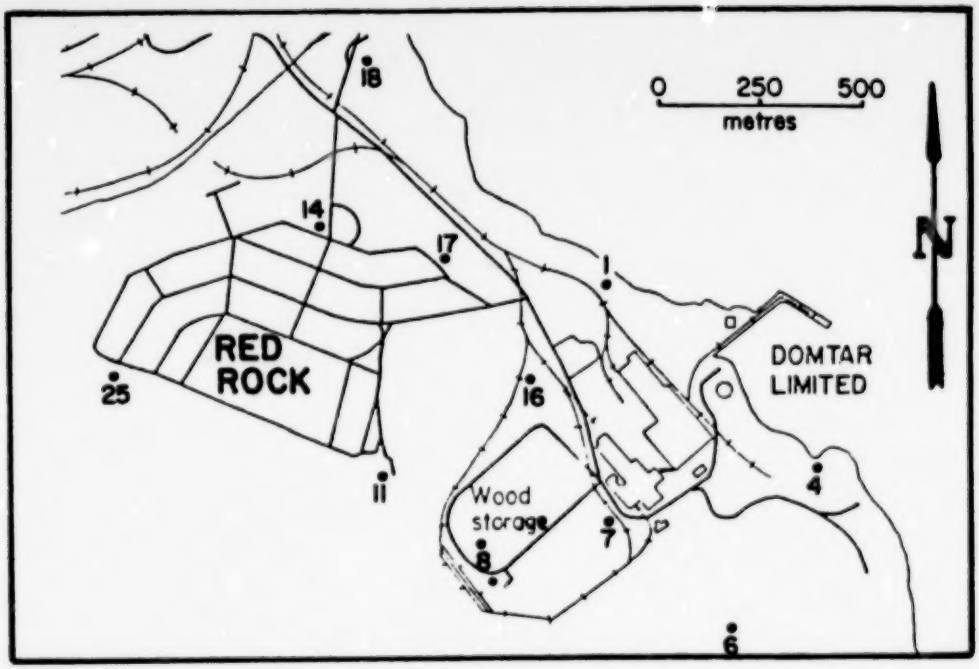


Figure 1. Snow sampling sites, Red Rock, 1986.

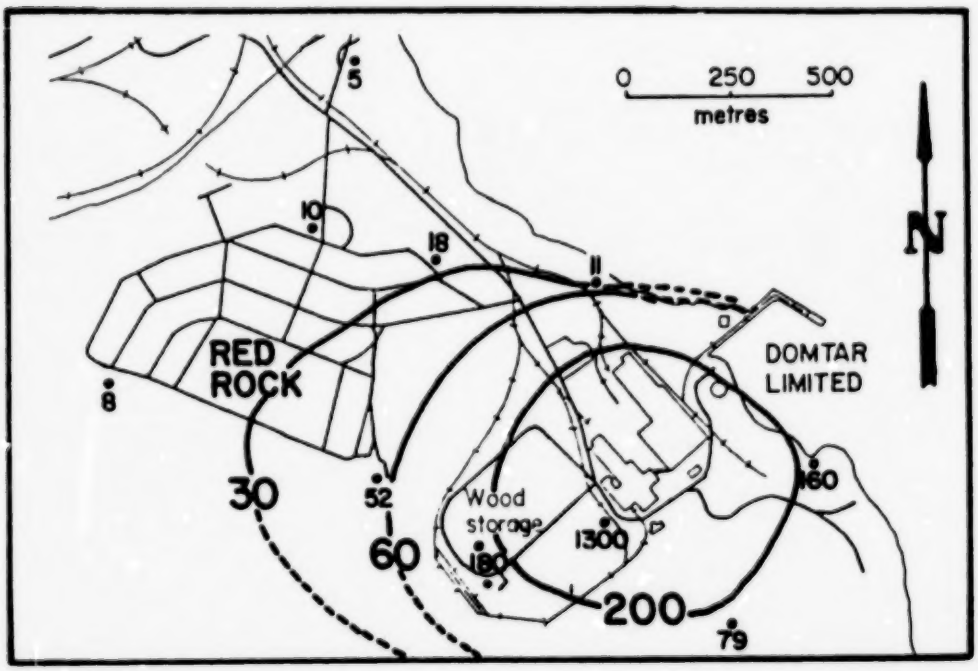


Figure 2. Levels of suspended solids (mg/l) in meltwater from snow collected in the vicinity of Domtar Packaging Limited, Red Rock, February 8, 1986.

TABLE 1. Levels of calcium, sodium, chloride, sulphate (mg/ℓ) and pH in meltwater from snow collected in the vicinity of Domtar Packaging Limited, Red Rock, February 8, 1978 and February 14, 1986.

| Site | Calcium | | Sodium | | Chloride | | Sulphate | | pH | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1978 | 1986 | 1978 | 1986 | 1978 | 1986 | 1978 | 1986 | 1978 | 1986 |
| 1 | 2 | 5 | 1 | 2 | <1 | <1 | 4 | 5 | 9.0 | 8.2 |
| 4 | 5 | 10 | 5 | 7 | <1 | 1 | 14 | 7 | 9.5 | 10.0 |
| 6 | | 7 | | 12 | | <1 | | 10 | | 9.8 |
| 7 | 84 | 38 | 35 | 45 | 32 | 4 | 74 | 62 | 11.4 | 9.9 |
| 8 | 6 | 5 | | 3 | 1 | <1 | 10 | 4 | 6.6 | 7.6 |
| 11[a] | 4 | 4 | 4 | 3 | 3 | <1 | 9 | 4 | 8.6 | 8.6 |
| 14[a] | 3 | 4 | 2 | 2 | 1 | 2 | 6 | 3 | | 8.5 |
| 16 | 8 | 8 | 6 | 6 | 4 | 2 | 13 | 9 | 10.0 | 9.7 |
| 17[a] | | 6 | | 4 | | 2 | | 6 | | 9.5 |
| 18[a] | 2 | 3 | <1 | 1 | <1 | <1 | 3 | 2 | 8.8 | 7.5 |
| 25[a] | 3 | 3 | 5 | 1 | 1 | <1 | 12 | 2 | 8.6 | 7.7 |
| Controls | <1 | <1 | <1 | 1 | <1 | 2 | <1 | <1 | 5.0 | 4.9 |
| Guidelines | 2 | | 2 | | 4 | | 3 | | | |

[a]Sites off mill property.

TABLE 2. Levels of carbon, solids (mg/ℓ) and conductivity (μmhos/cm) in meltwater from snow collected in the vicinity of Domtar Packaging Limited, Red Rock, February 14, 1986.

| Site | Carbon | | | Solids | | | Conductivity |
|---|---|---|---|---|---|---|---|
| | Dissolved inorganic | Dissolved organic | Total particulate | Dissolved | Suspended | Total | |
| 1 | 3 | 1 | 63 | 24 | 11 | 35 | 40 |
| 4 | 6 | 3 | 29 | 56 | 160 | 210 | 98 |
| 6 | 7 | 6 | 550 | 67 | 79 | 150 | 99 |
| 7 | 23 | | 66 | 370 | 1300 | 1700 | 300 |
| 8 | 4 | 10 | 23 | 35 | 180 | 220 | 38 |
| 11[a] | 3 | 3 | 3 | 27 | 52 | 79 | 37 |
| 14[a] | 2 | 2 | 1 | 18 | 10 | 28 | 34 |
| 16 | 4 | 3 | | | | | 73 |
| 17[a] | 3 | 2 | 8 | 34 | 18 | 52 | 54 |
| 18[a] | 1 | <1 | 4 | 11 | 5 | 16 | 25 |
| 25[a] | 2 | 1 | 4 | 13 | 8 | 21 | 77 |
| Controls | 0 | <1 | 2 | 3 | 2 | 5 | 15 |
| Guidelines | | | | | 30 | | 60 |

[a]Sites off mill property.

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